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ABSTRACT

A study was designed to identify cases of the successful implementation of technology in New York and Illinois; to document the strategies, processes, and procedures used in the successful implementation of statewide technology education programs; and to develop guidelines for the implementation of statewide technology education programs. Data were collected through telephone interviews with the state supervisors of technology education in New York and Illinois and with 10 teachers of technology education in each of those states. The following were among the conclusions reported: (1) teachers participated extensively in the implementation stage of the innovation-decision process; (2) teacher involvement in agenda-setting at the state level was not essential to the successful implementation of technology education programs; (3) successful implementation required an inservice professional development strategy sequence that began with awareness of the philosophy of technology education and then moved to hands-on classroom activities; and (4) a regional inservice professional development strategy contributed most to the classroom success of teachers. (The document also includes 20 guidelines for the statewide implementation of technology education and a 61-item bibliography.) (CML)

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THE IMPLEMENTATION OF STATE-WIDE CURRICULUM CHANGE IN TECHNOLOGY EDUCATION

A Summary of Research Report

by

Richard A. Boser

Graduate Fellow

Texas A&M University

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EXECUTIVE SUMMARY

THE IMPLEMENTATION OF STATE-WIDE CURRICULUM CHANGE IN TECHNOLOGY EDUCATION

by

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The successful implementation of state-wide curriculum change is a complex undertaking. It involves not only the individuals who actually carry out the change in the schools, but also other vested stakeholders in the community. Students, parents, teachers, administrators, and individuals and organizations external to the school all have the ability to facilitate or inhibit change, depending upon their commitment to the success of that change.

This study was designed to accomplish three objectives: (a) to identify cases of the successful implementation of technology education in selected states; (b) to document the strategies, processes, and procedures used in the successful implementation of state-wide technology education programs; and (c) to develop guidelines for the implementation of state-wide technology education programs.

Based on the review of literature, two states, New York and Illinois, were selected for this investigation. In each state, the state supervisor of technology education and 10 teachers of technology education programs were interviewed by telephone to obtain their perceptions of the curriculum implementation process. The findings from the interviews were tabulated to identify the ways that teachers participated in each stage of the innovation-decision process in an organization.

The following conclusions were derived from the investigation: (a) teachers participated extensively in the implementation stage of the innovation-decision process; (b) teacher involvement in agenda setting at the state level was not essential to the successful implementation of technology education programs; (c) successful implementation required an inservice professional development strategy sequence that began with awareness of the philosophy of technology education and then moved to hands-on classroom activities; and (d) a regional inservice professional development strategy contributed most the classroom success of teachers.

Twenty guidelines were developed for the state-wide implementation of technology education. These guidelines were based on the review of literature, the common implementation procedures in the two states, and the reflections of the interviewees on the implementation process in their state.

FOREWORD

by

Daniel L. Householder

If technology education is to meet the challenges of the current era, sweeping changes must be accomplished in the technology education program in the public schools. It is clearly not sufficient to organize a contemporary technology education program and prepare the appropriate curriculum documents. New programs must be widely accepted, adopted, and implemented if they are to make a difference in the education of young learners. However, curriculum developers and administrators have few research-based guidelines to assist them in attaining statewide acceptance of new programs.

The urgency of the need for change in technology education led Mr. Boser to undertake a study of the successful implementation of new technology education programs in two states. This report of his interviews with technology education teachers in Illinois and New York can provide useful guidelines for educators seeking to implement sweeping curriculum reform in technology education in other locations.

By highlighting similarities between the successful implementation strategies in the two states, Mr. Boser provides potentially generalizable suggestions for educators in other settings. On the other hand, his comments about differences between the two approaches may suggest variations which might be considered in specific settings, though not necessarily in all locations. The technology education profession will benefit from this pioneering study in the specifics of curriculum implementation.

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Introduction

Sarason (1971) stated "good ideas and missionary zeal are sometimes enough to change the thinking and actions of individuals; they are rarely, if ever, effective in changing complicated organizations (like the school) with traditions, dynamics, and goals of their own" (p. 213). For change to be effective in an organizational settings, it must address the needs of the individuals that comprise the organization, the organizational structure, and the relationship of the organization to the external environment in which it operates.

One model of organizational change that addresses this complex and dynamic process is proposed by Rogers (1983). Rogers began "looking within the organization at the innovation process" (p. 356) to determine the sequence of events. From this perspective of "process research" (p. 356), and additional research completed between 1971 and 1983, Rogers developed a sequential five step model, "Stages in the Innovation Process in Organizations" (p. 361).

The five step model of the innovation-decision process in organizations was synthesized from among the research reports of 3085 diffusion studies (Rogers 1983). The model deals with the two kinds of innovation-decisions typically made in organizations: "choices to adopt or reject an innovation that are made by a consensus among the group members" (p. 347); or "choices to adopt of reject an innovation that are made by a relatively few individuals . . . who possess power, status, or technical expertise" (p. 347). Rogers stated:

> The innovation-decision process is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. This process consists of a series of actions and choices over time through which an individual or an organization evaluates a new idea and decides whether or not to incorporate the new idea into ongoing practice. (p. 163)

According to Rogers (1983), the two stages in the innovation-decision process, initiation and implementation, are accomplished through five steps: (a) agenda setting, (b) matching, (c) redefining/restructuring, (d) clarifying, and (e) routinizing. Due to the sequential nature of innovation-decision process, Rogers suggested that the innovation has the potential to go awry at any of the stages.

Purpose of the Study

There were two purposes of this study. The first was to document the procedures and strategies used to implement successful state-wide technology education programs at the secondary school level in selected states. The second was to develop guidelines for implementing state-wide curricular change. The objectives pursued in order to accomplish the purposes of the study were:

1. To identify cases of the successful implementation of technology education in selected states.

2. To document the strategies, processes, and procedures used in the successful implementation of state-wide technology education programs.

3. To combine the documentation of previously used strategies and procedures and the commonalities documented in this study to develop a set

of guidelines for implementing state-wide curricular changes in technology education programs.

Procedure

New York and Illinois were selected for this investigation on the basis of the review of literature and six criteria that were established to correspond with the demonstration of successful state-wide technology education programs. Within each state, the state supervisor of technology education identified at least 10 exemplary teachers who had successfully implemented technology education in their school. The teachers of technology education programs who were nominated by their state supervisors served as the population of teachers for the research.

In each state, the state supervisor of technology education and 10 teachers of technology education were interviewed by telephone to obtain their perceptions of the curriculum implementation process. The researcher developed two separate interview schedules comprised of specific questions to guide the interviews. The interview schedules were based upon a review of literature and designed to reflect the innovation-decision paradigm for organizations synthesized by Rogers (1983).

The interview schedule for the state supervisors of technology education was designed to ascertain the role of the state department in the implementation of technology education. For teachers of technology education, an interview schedule was designed to solicit information about teacher participation in each of the five steps in the innovation-decision paradigm.

Results

The data from the interviews were tabulated to identify the ways that teacher participated in each of the five stages of the innovation-decision process as identified by Rogers (1983). The tabulated findings were then synthesized to develop for each state a listing of the ways that teachers participated in the state-wide implementation of technology education. In addition, the implementation procedures for the individual states were compared, noting those which were common to the two states and those which were unique to each state.

Table 1 identifies teacher participation in each stages of the curriculum innovation-decision process.

Table 1

Teacher Participation in the Stages of the Curriculum Innovation-Decision Process

Stage	New York	Illinois
1. Agenda setting at the state level	6	2
2. Matching	9	4
3. Redefining/restructuring	10	10
4. Clarifying	9	9
5. Routinizing	9	9
	(n=10)	(n=9)

The tabulated findings from each state were synthesized to list the ways that teacher participated in the state-wide implementation of technology education. Table 2 presents activities, events, and decisions in which teachers engaged during the innovation-decision process.

Table 2

The Ways that Teachers Participated in Each Stage of the Curriculum Innovation-Decision Process

	Stage and Activities	New York	Illinois
1.	Agenda setting		
	Participated in the Futuring Project	6	n/e
	Input at curriculum meetings	n/e	2
2.	Matching		
	Attended teacher-trainer summer program at State University College at Oswego	9	n/e
	State curriculum writing teams	2	1
	Wrote curriculum for pilot programs	0	1
	Pre-pilot of curriculum materials	4	2
	Conducted pilot test programs	5	3
	Provided demonstration programs	0	2
3.	Redefining/Restructuring		
	Developed instructional activities to match curriculum documents	4	n/e
	Wrote items for state-wide proficiency exams	2	n/e

Table 2 Continued

	Stage and Activities	New York	Illinois
	Provided inservice activities for other teachers	10	6
	Attended voluntary inservice training offered through state, regional, college, and professional sources	10	9
	Adapted state curriculum documents to local needs	2	6
	Selected textbooks	7	7
	Modified class schedules	4	2
	Modified laboratory organization	9	7
	Modified instructional materials and methods		
	Modified equipment inventories	9	8
4.	Clarifying		
	Provide inservice training through Technology Teacher Network	7	n/e
	School and community promotion of technology education	3	3
	Participated in inservice activities	9	9
5.	Routinizing		
	Provide inservice training through Technology Teacher Network	7	n/e
	Participated in inservice activities	9	9
		(n = 10)	(n = 9)

n/e - No equivalent event of activity in the state

Common Elements in Implementation

Many of the activities, events, and decisions employed in the state-wide implementation of technology education in New York and Illinois were common to both states. In addition, the number of teachers reporting participation in these common elements was also similar. Table 3 is the result of a compilation of the data on the ways that teachers participated in each stage of the innovation process in each state. The table presents the implementation procedures that were common to both states and the number of teachers that participated in each identified common element. Perhaps the most common element in the implementation approaches used in the two states centered upon inservice professional development programs. Indeed, inservice activities were relied upon to accomplish the state-wide implementation of technology education. While the details of reimbursement arrangements varied considerably, all but one of the 20 interviewees indicated that they received financial support for their participation in the inservice professional development program.

Table 3

Common Elements in the State-Wide Implementation of Technology Education

	Stage and Activities	New York	Illinois
1.	Matching		
	State curriculum writing teams	2	1
	Pre-pilot of curriculum materials	4	2
	Conducted pilot test programs	5	3
2.	Redefining/Restructuring		
	Provided inservice activities for other teachers	10	6
	Attended voluntary inservice activities offered through state, regional, college, and professional sources	10	9
	Adapted state curriculum documents to local needs	2	6
	Selected textbooks	7	7
	Modified class schedules	4	2
	Modified laboratory organization	9	7
	Modified instructional materials and methods	9	9
	Modified equipment inventories	9	8

Table 3 Continued

	Stage and Activities	New York	Illinois
4.	Clarifying		
	Attended inservice activities	9	9
	School and community promotion of technology education	3	4
5.	Routinizing		
	Attended inservice activities	9	9
		(n = 10)	(n = 9)

Unique Elements in Implementation

The unique elements in each state appeared to be largely matters of degree and organization. A possible reason for the differences which were identified may be the stage of the innovation within each state at the time of the study. While New York was moving toward the clarifying and routinizing steps in the innovation process at the time of the telephone interviews in May, 1989, Illinois will not officially implement technology education state-wide until 1990-91.

Several unique elements in state-wide implementation of technology education were identified for each state. In New York, the unique elements were:

1. The Futuring Project, that created a public agenda setting process to establish the competencies that graduating students should possess in the 1990s.

2. A state-mandated one unit of technology education for all students before the completion of grade eight. This requirement became effective with the 1986-87 school year.

3. A coordinated diffusion strategy, beginning with the development of teacher-trainers, who would then provide inservice professional development for other teachers.

4. The Technology Teacher Network (TTN), a regional inservice professional development team charged with providing continuing inservice activities for teachers, administrators, and guidance personnel.

5. State-wide coordination for the development of instructional material packages, called Technology Learning Activities (TLA's), to support the curriculum.

In Illinois, the unique elements included:

1. Curriculum direction and philosophy developed by university personnel.

2. A gradual change, with all former industrial arts programs required to teach the Illinois plan by the 1990-91 school year.

3. A voluntary program of paid summer internships to provide teachers of occupational subjects with the opportunity to work in business and industry.

Discussion

An investigation of successful programs is likely to identify the leaders in that field. This appeared to be true of the sample selected in this investigation. Many of the interviewees were involved in writing state curriculum materials, pilot testing new programs, and providing inservice

professional development for other teacher. In addition, seven of the New York interviewees and three of the Illinois interviewees reported executive level involvement in their state or local professional associations. Interpretation of the results of this investigation must consider the selectiveness of the sample.

Conclusions

The following conclusions were derived from the investigation:

1. The Rogers (1983) model of the innovation-decision process in an organization provided a useful framework for investigating the implementation of technology education.

2. No single implementation approach emerged as best from this investigation. Rather, the unique approaches evolved by New York and Illinois suggested that a sensitivity to state and local needs may be a prerequisite for successful state-wide implementation.

3. Teacher involvement in initiating the move to technology education at the state level of the educational organization was not essential to the successful implementation of technology education programs.

4. Teachers participated extensively in the curriculum innovation-decision steps of matching, redefining/restructuring, clarifying, and making routine the innovation.

5. Teachers perceived participation in all stages of the innovation-decision process in an organization as important to the successful implementation of technology education.

6. Teacher commitment to the state-wide implementation of technology education was established by participation in the implementation process.

7. Successful implementation required an inservice professional development strategy and a sequence of activities that began with awareness of the technology education and philosophy behind technology education and then moved to hands-on activities.

8. Teachers who successfully implemented technology education in their schools participated in a variety of inservice professional development activities at district, regional, state, and national levels.

9. Of the variety of inservice professional development in which teachers participated, regional inservice activities within the state were reported to have contributed the most to the successful implementation of technology education.

10. Hands-on inservice workshops that demonstrated the classroom activities associated with technology education were reported by the teachersof technology education as the most beneficial form of inservice activity at the current stage of the implementation process.

11. With the exception of intra-state regional inservice activities, no specific on-going support from school districts was reported by teachers seeking to establish technology education as a regular subject in the school enterprise.

Guidelines for Implementation

In the words of the Illinois State Board of Education (1987), "the process of implementing programmatic change in a regional delivery system is an extremely complex and delicate endeavor. It must be accomplished in ways that maintain the integrity of all people involved" (p. 14). The guidelines presented here reflect those concerns.

The guidelines proposed for the state-wide implementation of technology education programs were based upon the following criteria:

1. The procedures and strategies identified in the review of literature that facilitated the educational change process and were supported by this investigation.

2. The commonalities noted in the implementation procedures of this selected sample of innovative technology education programs.

3. The consensus of the reflections of the interviewees on their experience in the successful implementation of technology education programs.

Change is a fluid process. Very few of the events, activities, or decisions that make up that process may be categorized as occurring at a specific step during the innovation-decision process. However, to provide a structure the guidelines are grouped into three sections: (a) process guidelines, that are relevant throughout the innovation-decision process; (b) initiation stage guidelines, that are relevant in the early steps of the innovation-decision process; and (c) implementation stage guidelines, that are relevant in putting the innovation into regular usage in the school. Although

the guidelines are numbered, no attempt was made to rank the guidelines or to present the guidelines in an order of importance.

Process Guidelines

The state-wide implementation of technology education should:

1. Proceed from a knowledge of the change process.

2. Use a framework for the curriculum implementation that parallels the innovation-decision process in an organization.

3. Consider the transition from industrial arts to technology education as a process with definite, although not always distinct, steps that occur over a period of time.

4. Involve students, parents, teachers, guidance personnel, administrators, and interested individuals and organizations external to the school as all have the ability to facilitate or inhibit the move to technology education.

5. Identify the existing barriers to change and develop strategies to overcome these barriers.

6. Provide opportunities for voluntary teacher participation at all stages of the innovation-decision process to develop ownership and commitment to the move to technology education.

7. Provide adequate funding for pilot programs, curricular materials, facility and equipment changes, and inservice professional development.

8. Develop a series of inservice professional development programs that proceed in steps that parallel the stages of the innovation-decision process. Initial inservice activities should emphasize the philosophy and

rationale of technology education and the advantages to students and teachers. At the implementation stage, inservice activities should emphasize hands-on activities.

9. Conduct inservice professional development programs using the teachers-teaching-teachers methodology.

10. Pay teachers for participating in inservice professional development programs.

11. Promote the new program in the community.

12. Actively seek the moral and financial support of interested community stakeholder groups.

Initiation Stage Guidelines

The state-wide implementation of technology education should:

13. Develop and nurture committed leadership for the change.

14. Consider curriculum implementation as beginning with the conceptualizing and designing of curriculum materials. Commitment to the implementation may then be well established prior to beginning instruction in the schools.

Implementation Stage Guidelines

The state-wide implementation of technology education should:

15. Provide an "unfreezing" event or action to create a climate conducive to change.

16. Provide classroom support for teachers through inservice professional development, curriculum guides, and instructional materials.

17. Provide demonstration programs in a variety of locations and demographic situations throughout the state.

18. Seek input and participation from individuals who are resistant to the change as well as from those who are supportive of the change.

19. Provide guidance for modifying facilities and the changing equipment to implement the program.

20. Provide inservice professional development activities through an intra-state regional delivery system that targets the needs and concerns of area teachers.

Discussion of the Guidelines

The guidelines are based on findings of this research and the review of literature. Fifteen of the 20 guidelines presented are supported by at least one other source identified in the review of the literature. Guidelines 2, 8, 10, 15, and 20 are based solely on the results of this investigation. While they are not supported by previous research, they appeared to be important features of the change process in the two situations studied.

Taken as a group, the guidelines are intended to serve as a base for guiding practice in implementing curriculum change. Researchers may also find the guidelines helpful in the design of subsequent investigations.

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